SUPPLEMENT TO THE CONTRIBUTIONS TO THE SYNANTHROPIC (ADVENTIVE) FLORA OF THE RAILROADS IN ST. LOUIS, MISSOURI, U.S.A.[1]

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ABSTRACT

Based on 93 excursions from 1972–1980, 22 additional synanthropic species were discovered on the railroad network in St. Louis. Included were 13 new species and 3 new varieties for the flora of Missouri. In addition 37 taxa, native to Missouri but probably introduced into the St. Louis region, are discussed.

My summary paper on synanthropes of the railroads of St. Louis (Mühlenbach, 1979) was based only on fieldwork from 1954 through 1971. From 1972 through 1980 93 additional excursions were undertaken on the Missouri side of the Mississippi River. In addition, from 1978 through 1980 railroad premises and freight yards on the Illinois side of the Mississippi River were visited 38 times and the results were published by Shildneck, Jones, and Mühlenbach (1981). The synanthropic floras were very similar on both sides of the Mississippi River. Only three species were found in Illinois that were not encountered in St. Louis, *Draba verna* L., *Alliaria officinalis* Andrz., and *Geranium pusillum* Burm. f. A fourth species—*Mirabilis linearis* (Pursh) Heimerl, synanthropic in Illinois but native in Missouri—was found only in Illinois.

For this supplement only 22 new additional synanthropic species were discovered, compared to the 393 of the first report (Mühlenbach, 1979). Included among these new discoveries are plants collected during the earlier years but not fully identified until recently. Although the low percentage of new discoveries for the latter period can be expected after the initial 17 years of concentrated fieldwork, an additional factor also plays a part. This was the much greater use of herbicides. Traditionally many synanthropes have been discovered in the classification or switching tracks, areas where freight trains are rearranged for further movement. Most such areas are now devoid of vegetation throughout the year because of herbicide spraying. During the early years of my fieldwork the vegetation in the classification tracks was frequently not sprayed until the plants were knee-high. Then one would indeed find marvellous plants in abundance in those places. Such abundant plant growth is now seen only in exceptional cases. One case is reviewed later in detail.

RESULTS

Novelties for the state of Missouri are noted first. They include 13 species and 3 new varieties of known species. The names of the cited railroad companies are substituted by their official acronyms: BN (Burlington Northern); C&EI (Chicago & Eastern Illinois); MKT (Missouri-Kansas-Texas); MP (Missouri Pacific); MRS

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(Manufacturers Railway); RI (Rock Island, now in the possession of St. Louis Southwestern Railway = Cotton Belt Route (SSW)); SL-SF (St. Louis & San Francisco Railway, now in the possession of BN); TRRA (Terminal Railroad Association of St. Louis).

Bromus japonicus Thunb. var. **grandis** Vel.

M 3830A, Carrie Ave. Fr. Yd. (RI), 28 June 1973, one specimen amidst a colony of the typical specimen of this species. Determined by H. Scholz. Bulgaria (Velenovský, 1898).

Bromus arvensis L.

M 4169, Carrie Ave. Fr. Yd. (RI), 4 July 1978, one colony. *M 4172,* Bulwer Yd. (TRRA), 4 July 1978, two specimens. Both collections determined by H. Scholz. Eurasia.

Echinochloa utilis Ohwi & Yabuno.

M 1577, Bremen Fr. Yd. (TRRA), 7 Sept. 1959, one specimen. *M 3349,* Lesperance St. Fr. Yd. (MP), 25 July 1970, one colony. Both collections were previously identified as *E. crusgalli* (L.) Beauv. The new identification follows the annotations of P. Michael (University of Sydney, N.S.W.). This species was first discovered in 1961 in Sakai, Province Izumi, Japan, and described as a new species by Ohwi and Yabuno in 1962 (Ohwi, 1962). A fuller morphological and geographical description is given by Yabuno (1966) and especially by Vickery (1975: 197), who noted that "prior to 1962 this species appears to have been widely confused with *E. frumentacea* of India . . . the two are totally distinct . . . . *E. utilis* doubtless originated in eastern Asia, including Japan, and is considered by Yabuno . . . and by Ohwi to have originated from *Echinochloa crus-galli* . . . . Cultivated for forage and grain and may be an occasional weed of cultivated areas . . . ."

Carex crawfordii Fern. (*C. scoparia* Schkuhr var. *minor* Boott).

M 3751, former Railway Exchange Agency (REA, 1730 Clark Ave.) leased from TRRA, 24 June 1972, one large, dense tuft. Determined by F. J. Hermann. It was most unusual and perplexing to find *C. crawfordii.* It is basically a northern species, frequent in Canada (Nfld.-B.C.) and in 10 of the 13 northern border states of the U.S.A. according to the literature and the herbarium material at MO. Only a few states are cited southwards. The nearest state to Missouri according to Fernald (1950) is Tennessee where it occurs in the high mountains. In the principal area of its distribution, Gleason (1968) characterizes the habitats as wet soil, meadows, swamps, and shores, places that very seldom produce synanthropes. Northern introductions are exceptional events, in Europe as well as in the U.S.A. The assumption that we are dealing with a native plant cannot be completely neglected, but the probability seems low. I (Mühlenbach, 1979) previously cited several synanthropes for which native status could not be completely ruled out. Nevertheless, I classified them as synanthropes because they grew in association with other rare synanthropes. I treat *C. crawfordii* likewise. It grew on the track along one of the loading platforms of the former REA, again in company of interesting and rare synanthropes. See Hermann (1970) for further details.

Salix alba L. × **S. fragilis** L. (*S.* × *rubens* Schrann).

M 2068 (flowers) and *M 2183* (leaves), from a unicate shrub, 7 April 1963 and 28 Aug. 1963, Harlem Fr. Yd. (TRRA). Determined by G. W. Argus. Eurasia.

Rumex cristatus DC. (*R. graecus* Boiss. & Heldr.).

M 725, SL-SF, west of Knox Ave., 14 Aug. 1955, one specimen. *M 3967,* SL-SF, west of Macklind Ave., near the Des Peres sewer, 5 July 1976, one specimen. *M 4028,* MP, at the branching of the siding from the trunk line to the RF Macaroni and Spaghetti Works, 30 May 1977, one small colony. *M 4060,* Lindenwood Fr. Yd. (SL-SF), 17 Sept. 1977, three small colonies. *M 4188,* Baden Fr. Yd. (MKT), 15 July 1978, one specimen. All collections determined by K. H. Rechinger. To the best of Rechinger's knowledge *R. cristatus* has not been found in the U.S.A. as an adventive plant. This species was treated by him in Hegi (1953) and in Jalas & Suominen (1979). Eastern Mediterranean. I succeeded also in discovering this plant in Illinois (*M 4224,* 4 Aug. 1978, along the Eastern Connection between the Madison Fr. Yd. of TRRA and that of the Chicago and North Western Railway of the same name). *Rumex orbiculatus* Gray, cited in Steyermark (1963: 580), turned out to be the first specimen of *R. cristatus* found in St. Louis (*M 725*).

Polygonum cuspidatum Sieb. & Zucc. var. **compactum** (Hook. f.) Bailey.

M 3356, MP, south of Zepp St., 30 July 1970, two specimens. *M 3476,* TRRA, west of Union

Blvd., 7 Nov. 1970, one colony. In both cases the plants were sterile. Determined by H. A. Wahl. Japan.

Brassica napus L. var. **napus** (*B. napus* L. var. *arvensis* (Lam.) Thellung).

M 100, between the right-of-ways of MP and SL-SF, west of the Kingshighway overpass, 29 May 1954, one specimen. Determined by H. Scholz. Known only as a cultigen (rape, an oil and forage plant).

Brassica oleracea L.

M 1565, North St. Louis Fr. Yd. (BN), 23 Aug. 1959, one specimen (B). *M 2088,* Carrie Ave. Fr. Yd. (RI) or Bulwer Yd. (TRRA), 30 May 1963, one or two? specimens. Both determined by H. Scholz. Widely cultivated vegetable, originating in the Mediterranean.

Reseda lutea L.

M 3931, Carrie Ave. Fr. Yd. (RI), 12 June 1976, one specimen. Determined by H. Scholz. Eurasia. This species is missing in Steyermark's *Flora of Missouri,* while Fernald (1950) cites Missouri among states in which *R. lutea* is introduced. As I stated earlier (Mühlenbach, 1979), Steyermark's (1963) *Flora of Missouri* was used as the starting point for the decision as to what is native and introduced in Missouri. Besides, Gleason (1968) explicitly omits Missouri from the list of states where this species has been found.

Viola arvensis Murray.

M 3863, North St. Louis Fr. Yd. (BN), 27 June 1974, one small colony. Determined by N. H. Russell and H. Scholz. Eurasia. *Viola arvensis* belongs to the group of plants which Steyermark (1963) excluded from his Flora as erroneously determined.

Oenothera heterophylla Spach subsp. **heterophylla.**

M 942, O'Fallon Fr. Yd. (TRRA, now dismantled), 16 June 1956, two large specimens, from which only parts were taken; *M 1018,* 14 July 1956, the same two plants. This species was annotated by W. Dietrich (University of Düsseldorf). It was previously determined as the native *O. rhombipetala* Nutt. According to Correll & Johnston (1970) a plant of eastern and north-central Texas and western Louisiana.

Plantago indica L. (*P. ramosa* (Gilib.) Aschers).

M 3977, Carrie Ave. Fr. Yd. (RI), 17 July 1976, one specimen. Determined by H. Scholz. Eurasia.

Lonicera maackii Maxim.

M 3985 (flowers) and *M 4001* (fruits) from the same plant (?), MP between Shaw Blvd. and Kingshighway Blvd., 14 Aug. 1976 and 18 Sept. 1976, one or several shrubs. *M 3997* (flowers) and *M 4004* (fruits), from the same shrub, 28 Aug. 1976 and 4 Oct. 1976, Inbound Fr. Yd. (RI, SL-SF, C&EI), one shrub. Determined by R. E. Weaver. Asia.

Symphoricarpos albus (L.) Blake.

M 3485, MP, between Tower Grove Ave. and Chouteau Ave., 8 Nov. 1970, one shrub. Determined by R. E. Weaver. North America, missing in Missouri.

Lactuca sativa L.

M 4002, Lesperance St. Fr. Yd. (MP), 18 Sept. 1976, one specimen. It lay uprooted on the ground, but it was seen in living condition on 28 Aug. when it was too juvenile for collecting. Determined by R. P. Wunderlin. Widely cultivated vegetable. Origin uncertain.

The following eight synanthropes were reported by Steyermark (1963) to occur in Missouri, but were not previously observed by me in the railroad network from 1954 through 1971 or were not surely recognized at that time.

Festuca ovina L.

M 2963, South 7th St. Fr. Station (MP), 21 July 1968, three specimens. Determined by R. W. Pohl. Eurasia.

Rorippa sylvestris (L.) Bess.

M 3822, dead end of the MP's Christy Lead, along Landsdowne Ave., 15 May 1973; *M 3832,* 30 June 1973, the same small colony. Determined by R. L. Stuckey. Eurasia.

Syringa vulgaris L.

M 3856, Pickrel Fr. Yd. (TRRA), 4 June 1974, one sterile shrub. Determined by R. E. Weaver. Europe.

Physalis ixocarpa Brotero.

M 2358 and *M 2388,* South Ranken Yd. (TRRA), 14 June and 19 July 1964, in both cases one specimen (UMO). Determined by D. B. Dunn and W. G. D'Arcy. Southwestern U.S.A. and Mexico.

Physalis angulata L.

M 2493A, River Fr. Yd. (MRS), 10 July 1965,

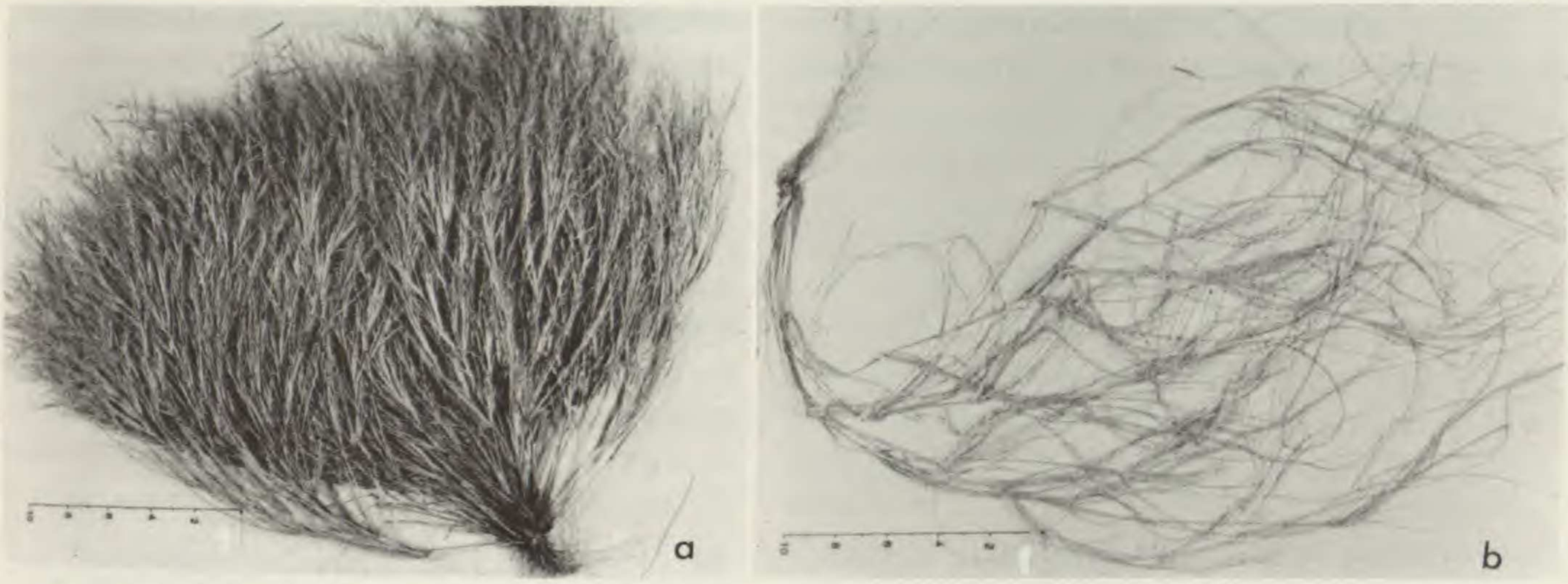

FIGURE 1. *Aristida oligantha* Michx.—a. Densely tufted, highly branched form (*Mühlenbach 4074*, MO).—b. Greenhouse-grown progeny of *Mühlenbach 4074* with normal growth form.

one specimen. Determined by W. G. D'Arcy. Southern U.S.A., West Indies, South America, Asia.

Tagetes erecta L.

M, Conrad & Conrad 3899, Baden Fr. Yd. (MKT), 6 Sept. 1975, one specimen. Determined by R. P. Wunderlin. Discovered by J. Conrad. Mexico.

Matricaria maritima L. var. *agrestis* (Knaf) Wilmott (*M. inodora* L.).

M 3891, North St. Louis Fr. Yd. (BN), southern reserve tracks of the grain elevator, 24 June 1975, one colony. Determined by R. P. Wunderlin. Europe.

Taraxacum laevigatum (Willd.) DC. (*T. erythrospermum* Andrz.).

M & Conrad 3916, Lesperance St. Fr. Yd. (MP), 1 Nov. 1975, one specimen. Determined by R. P. Wunderlin. As mentioned by me (Mühlenbach, 1979) a constant lookout for this species was carried out from 1956, but in vain. The first unicate was finally located in 1975. It was also the last one. It is odd indeed for on the streets of St. Louis *T. laevigatum* does not seem to be an extreme rarity.

The following species may also be added to the list of railroad synanthropes in St. Louis.

Cirsium undulatum (Nutt.) Spreng.

M 639, 18 June 1955; *M 1254,* 4 July 1957, Harlem Fr. Yd. (TRRA), one specimen. According to Steyermark (1963) it is rare in Missouri (five counties) and ranges from British Columbia to Arizona, east to Manitoba, North Dakota, Nebraska, Missouri and Oklahoma; in other words, it must be considered to be native. The same judgement on native status in Missouri and the general range of this species is given by Fernald (1950). But G. B. Ownbey, who annotated all my *Cirsium* collections, wrote to me on 9 December 1971: "You also have three additional American species: *C. discolor, C. altissimum* are native in your area, *C. undulatum* is adventive from the West, the Great Plains, to be exact."

The total number of species recorded from the railroads was 901, 414 being synanthropes and 487 native. About 20 additional species have withstood all efforts at determination. Some are too juvenile, some overripe, some damaged. Many of them are *Amaranthus* hybrids in different combinations. As previously, I have tried to avoid publication of uncertainly determined material.

Of the native species, one group merits a closer look, namely native Missouri plants that were collected in St. Louis County for the first time. (Steyermark (1963) combined the city of St. Louis with St. Louis County for this purpose, as do I.) Altogether there were 37 taxa (23 species, 14 intraspecific taxa) that were not previously reported from this area.

Most of them were seldom encountered, and they were usually not numerous. Likewise, the majority tend to be rare in Missouri. According to Steyermark (1963) eighteen of them were reported in five or fewer counties, six even being found only in one county. Twelve were known from six to twenty counties, and only seven were found in twenty-one and more counties. Stey-

ermark mentions further that among these thirty-seven taxa, eight grow along railroads. At least half of the thirty-seven were originally restricted to the western half of the state. Quite a few (seven) were known only from the southeastern lowlands (Missouri's Bootheel). It is of course of interest to learn the status of these plants. Are they autochthonic elements of St. Louis County's flora or have they been introduced by one means or another? It seems likely that the majority, even the great majority, have in fact been introduced. As mentioned, a majority of these plants were until recently only known from the western half of the state or from the Bootheel with no known intermediate stations. Only eight taxa were found in one or two of three counties (St. Charles, Franklin, Jefferson) bordering St. Louis County. Surely many of these native plants that appeared in St. Louis did not originate in Missouri itself but came from far away. It is easy to prove such assertions when varieties and forms are found that are missing in the native flora. Such observations have been made in Europe, but not in Missouri. From 1954 through 1971 the richest freight yards with rare synanthropes were Carrie Ave. (RI) and Baden (MKT). Of interest is the fact that half of the introduced natives were also found in both these yards. This is an additional indication that they are indeed introductions.

Five taxa were found along the so-called car cleanout tracks, where heavily polluted freight cars are swept and tidied up before loading. These tracks are now and then accompanied by piles of rubbish which, as they contain much combustible material, are occasionally set on fire. Finally the remainder is hauled away. It is astonishing to see that in spite of such harsh conditions many plants manage to survive. Such sites are the most promising places in the freight yards for discovering synanthropes. These tracks are quite confined in size and length and were visited and meticulously inspected at least three times in a season. In such places almost every plant, be it synanthrope or native, must be introduced by the railroad operations. It is almost inconceivable that these native plants had been overlooked for years before they were noticed.

Recently I became aware of a paper by Schultz (1976) on the synanthropic flora of the railroad system in Riga, Latvia. From Schultz's remarks and my own observations in St. Louis and Edmonton, Canada, it is quite evident that the role of refuse, dirt, and debris, which normally accompanies freight, is more important in the introduction of synanthropes than the role of the freight itself. This conclusion has apparently never been explicitly stated in the literature, but its importance is underscored by comparing the way refuse is handled in St. Louis and Riga compared with Edmonton. In the huge Calder Yard of the Canadian National Railways in Edmonton, freight cars are cleaned in an elaborate waste disposal system in which all solids are removed by washing or a vacuum system and taken away by truck to garbage dumps or an incinerator. In both St. Louis and Riga the cleaning system is much less elaborate, and solid refuse ends up on the car cleanout tracks and nearby areas. As a consequence, the car washing areas of the railroad yards in St. Louis and Riga were the richest sites for synanthropes, whereas very few synanthropes have ever been found in the vicinity of the Edmonton facilities.

The remainder of these thirty-seven native plants are most probably also introduced. Numerous observations in European yards have often demonstrated the introduction of native plants into them. One may even speak about secondary or even triple introduction, as for instance, when European plants naturalized in South Africa or Australia are reintroduced into Europe together with their native South African or Australian associates. One of the most frequently encountered plants of this group in Missouri, *Chenopodium desiccatum* var. *desiccatum*, has until now only been reported from one county, Jackson.

One other phenomenon should not be overlooked. As experience in Europe has taught, quite a few plants are able to spread spontaneously along trunk lines by ferroviatic migration from one station or yard to a neighboring one. Such evidence is missing in St. Louis. Eight taxa were indeed found on the right-of-way of different trunk lines or along some sidings, but only one of them was also found in a yard. They are all rarities. The participants of a ferroviatic migration usually show a distinct expansion along trunk lines, something which was totally missing in St. Louis.

The native introduced plants are the following:

Equisetum hyemale L. var. *pseudohyemale* (Farw.) Morton.

M 121, 5 June 1954, one colony that has shown intention to persist. This species was located later

in several other places. Determined by R. M. Tryon.

Typha angustifolia L.

M 2472, 31 May 1965, one large colony, persisting for many years. Another colony was later discovered, but not collected.

Muhlenbergia frondosa (Poir.) Fern. f. *commutata* (Scribn.) Fern.

M 2228, 21 Sept. 1963, one small colony. Determined by R. W. Pohl.

Brachiaria platyphylla (Griseb.) Nash.

M 2245, 29 Sept. 1963, two specimens. *M 3069,* 30 Oct. 1968, one large tuft. Determined by J. B. Van Schaack and R. W. Pohl.

Paspalum setaceum Michx.

M 3614, 12 July 1971, one colony. Determined by R. W. Pohl.

Cyperus odoratus L. (*C. ferax* L. C. Richard).

M 1862, 16 Sept. 1961, one specimen. *M 3427,* 13 Sept. 1970, scattered. Determined by R. Kral and T. M. Koyama.

Scirpus atrovirens Willd. var. *georgianus* (Harper) Fern.

M 3290, 9 June 1970, one dense colony or a huge tuft. Determined by T. M. Koyama.

Carex austrina (Small) Mackenz. (*C. muhlenbergii* Schkuhr var. *australis* Olney).

M 1755, 28 May 1961, one tuft (US). *M 2334,* 16 May 1964, one huge tuft. Determined by F. P. Hermann.

Tradescantia ohiensis Raf. × *T. virginiana* L.

M 1763, 30 May 1961, several specimens. Determined by E. Anderson.

Polygonum coccineum Muhl. var. *pratincola* (Greene) Stanford. *M 2984,* 15 Sept. 1968, one colony. Determined by H. A. Wahl.

Polygonum pennsylvanicum L. var. *laevigatum* Fern. f. *albineum* Farw.

M 2578, 9 Oct. 1965, one specimen. *M 2814,* 18 June 1967, one colony. Determined by H. A. Wahl.

Chenopodium desiccatum A. Nelson var. *desiccatum.*

M 1794, 1 July 1961, five specimens. Eleven collections followed. Eight of them came from the same yard. The impression is that this plant is quite widespread in St. Louis. It was known until now only from Jackson County. All determined by H. A. Wahl.

Chenopodium strictum Roth var. *glaucophyllum* (Aellen) Wahl.

M 1860C, 16 Sept. 1961, four specimens. *M 1884A,* 6 Oct. 1961. Determined by H. A. Wahl.

Mirabilis hirsuta (Pursh) MacM.

M 2373, 21 June 1964, one small colony (about eight specimens) (UMO). The plant grew on the same place the next year (*M 2458,* 22 May 1965), but then disappeared. Determined by D. B. Dunn.

Polanisia dodecandra (L.) DC. var. *trachysperma* (T. & G.) Iltis.

M 1807, 29 July 1961, two specimens. Determined by H. H. Iltis.

Draba reptans (Lam.) Fern. var. *micrantha* (Nutt.) Fern.

M 3498, 20 April 1971, one large colony. Determined by R. L. Stuckey.

Fragaria virginiana Duchesne var. *virginiana.*

M 3225, 25 April 1970, few specimens. Determined by F. G. Meyer.

Rubus frondosus Bigel. (*R. pennsilvanicus* Poir.).

M 3965, 5 July 1976, a small colony. Determined by R. E. Weaver.

Rosa arkansana Porter.

M & K. Kramer 556, 7 May 1955. Determined by W. H. Lewis.

Schrankia uncinata Willd. (*S. nuttallii* (DC.) Standl.).

M 2462, 22 May 1965, one specimen. Determined by D. Isely.

Lotus americanus (Nutt.) Bisch. (*L. purshianus* Clements & Clements).

M 1770, 17 June 1961, five or six sterile specimens (only one taken). *M 1789,* 1 July 1961, three specimens at the same place. Determined by J. D. Dwyer.

Psoralea tenuiflora Pursh var. *floribunda* (Nutt.) Rydb.

M 1945, 20 May 1962, one specimen. *M 1949,* 20 May 1962, one splendid specimen surrounded by many small sterile ones. Both collections gathered in the same freight yard. Determined by D. Isely.

Petalostemon multiflorum Nutt.

M 1978, 8 July 1962, one colony. Determined by L. H. Shinners.

Parthenocissus inserta (Kerner) K. Fritsch.
M 2930, 19 May 1968, one colony. Determined by K. R. Robertson.

Chaerophyllum tainturieri Hook.
M 1635, 11 June 1960, two specimens. Six further collections followed. This species is not a rarity in St. Louis. Determined by M. E. Mathias.

Spermolepis echinata (Nutt.) Heller.
M 1729, 13 May 1961, one colony, observed on the same spot several times later, also in 1962. Determined by M. E. Mathias.

Ptilimnium capillaceum (Michx.) Raf.
M & White 4045, 23 July 1977, two dwarf specimens. Determined by M. E. Mathias.

Monarda punctata L.
M 1785, 25 June 1961, few specimens. *M 3938,* 12 June 1976, one specimen. Determined by J. A. Steyermark and A. G. Jones.

Penstemon tubaeflorus Nutt.
M 2098, 2 June 1963, one small colony. Determined by A. G. Jones.

Solanum carolinense L. f. *albiflorum* Benke.
M 3086, 4 June 1969, five specimens. *M 3089,* 4 June 1969. In two different places.

Astranthium integrifolium (Michx.) Nutt.
M 1822, 19 Aug. 1961, one specimen. Determined by W. H. Lewis.

Aster parviceps (Burgess) Mackenz. & Bush.
M 2262, 6 Oct. 1963, one small colony or a large tuft, also *M 2305,* 26 Oct. 1963. Determined by R. P. Wunderlin.

Aster dumosus L.
M 2568, 30 Oct. 1965, one huge specimen. More flowers than leaves, a "white cloud" indeed. Determined by R. P. Wunderlin.

Rudbeckia amplexicaulis Vahl (*Dracopsis amplexicaulis* (Vahl) Cass.).
M 2111, 22 June 1963, one specimen. *M 3938,* 12 June 1976, one specimen. Determined by R. P. Wunderlin.

Echinacea angustifolia L.
M 2119, 25 June 1963, one specimen. Determined by R. P. Wunderlin.

Helianthus rigidus (Cass.) Desf. ssp. *subrhomboides* Heiser (*H. laetiflorus* Pers. var. *rigidus* (Cass.) Fern.).
M 2745, 9 Oct. 1966, one colony. Determined by C. B. Heiser, Jr.

Aster pilosus Willd. var. *pringlei* (Gray) Blake.
M 2769, 30 Oct. 1966, few specimens. Determined by R. P. Wunderlin. This taxon can even be considered as a novelty for Missouri, because it was excluded in Steyermark (1963) as erroneously determined.

Finally three species will be mentioned that were not found along the railroads, but that are all very rare synanthropes, previously observed in Missouri in only one or two counties of Missouri outside St. Louis.

Stellaria graminea L.
M 3929, 6 June 1976, lawn along the house, 5201 Landsdowne Ave., one very dense colony persisting in the following years. The residents of this house were unable to explain how this plant could have arrived here. Determined by J. McNeil. Eurasia.

Papaver somniferum L.
M 1667, 16 July 1960, between the sidewalk and the house, 6422 N. Broadway, one specimen. Unknown in the wild, probably originating in the Mediterranean region.

Coronopus didymus (L.) Sm.
M 3851, 1 June 1974, in the backyard of my house, 4984 Neosho St., one colony, persisting there up to now. Determined by R. L. Stuckey. Europe. I suspect that this synanthropic plant has been "introduced" by me, like a number of plants mentioned earlier (Mühlenbach, 1979: 101). They suddenly appeared on my property one after another. They are all frequent plants on the railroads in St. Louis. For this reason I consider them as introductions from the railroads to my backyard. The seeds were picked up accidently during my excursions by my clothing and later stripped off. Especially the cuffs of my trousers were frequently full of seeds of different plants. Unfortunately, I have never seen *Coronopus didymus* on the railroads. However, this plant is very inconspicuous and might have been overlooked. One more new introduction, *Eupatorium rugosum* Houtt., was discovered in my backyard in 1979. It is common along the railroads. The last arrival was *Carduus nutans* L. In this case I do not blame the railroads. Most probably the seed was transported by wind from some vacant lot in the city where this plant has spread considerably in the last few decades.

It is also worthwhile to mention a weed that unexpectedly appeared in the Missouri Botanical Garden. *Chenopodium ficifolium* Sm. was discovered by the Director of the Kew Royal Botanic Garden, J. P. M. Brenan, on his visit to the Missouri Botanical Garden, on the lot behind the newly erected Lehmann Building (*W. G. D'Arcy 5963,* 27 June 1972). *Chenopodium ficifolium* was found at several other places in the Garden in the later years. It was last observed in 1976.

Finally, a most unusual collection of *Aristida* (*M 4074,* former RI, SL-SF and C&EI, Inbound Fr. Yd., 22 Oct. 1977) may be mentioned. It was originally collected as a unicate in a normal population of *A. oligantha* Michx. As illustrated in Figure 1a, which represents only one-third of the plant, it was extremely densely tufted and highly branched. The size of the spikelet parts were as follows: lower glume 0.9–1.2 cm long including the awn 0.1–0.2 mm long, 5–7-nerved, upper glume 1.4–1.6 cm long including the awn 0.4–0.5 mm long; lemma 1.1–1.6 cm long, the central awns 1.6–1.8 cm long, the lateral awns 1.3–1.8 cm long. This specimen seems not to have an exact parallel with any described species in this large genus. A number of prominent agrostologists studied it but were unable to name it. It was, however, generally thought to be closely related to *A. oligantha* Michx., a species with glumes (1.5–)2–3 cm long, the lower 3–5-nerved, the lemma (1.5–)1.8–2.2 cm long and the awns (2–)4–7 cm long. Subsequently seeds of *M 4074* were grown (by Dr. P. Hoch) in the greenhouse. Progeny fell within the normal range of *A. oligantha.* The branching was much less dense (Fig. 1b), and spikelet parts range as follows: lower glume 1.8–2.0 cm long, 5-nerved, upper glume 2.0–2.4 cm long, lemma 1.4–1.5 cm long, awns 3.7–4.3 cm long. The unusual plant may well represent an extreme recombinant or a mutant, although unusual growth effects due to chemicals in its environment cannot be completely disregarded.

It is clear beyond any doubt that modern weed killing exerts a disastrous effect on the railroad vegetation. It was of special interest to observe that in spite of this the vegetation may quite rapidly reappear when the herbicide spraying is suddenly discontinued. This was observed in both Ranken yards (TRRA). These yards were used as holding yards for passenger trains. As the number of these trains constantly dwindled, the yards were abandoned and later dismantled. Of course, herbicide spraying was discontinued. A nice vegetation reappeared, demonstrating at the same time the phenomenon of trivialization, the process whereby native species take over synanthropes.

But events of another kind took place in another yard, namely, Carrie Ave. freight yard (RI). This yard had the highest yield of rare synanthropes (Mühlenbach, 1979: 92). Here, as everywhere, the effects of weed killing increased each year. But in 1974 weed killing was suddenly stopped for two years, while the railroad company continued normal operations, contrary to the situation in the Ranken yards. When I visited Carrie Ave. again in 1976, a luxurious vegetation had reappeared with a splendid display of synanthropic plants, reminiscent of bygone times 20 years ago. Even two Missouri novelties were discovered (*Reseda lutea* and *Plantago indica,* as unicates). One frequently hears about vanishing prairie, rain forests, and so on, but the same thing is now happening to the railroad flora in St. Louis and, of course, everywhere else as well. Only very few have realized that.

Later in 1976 the freight yard was thoroughly sprayed with herbicides and the whole splendor was annihilated. In the autumn this yard looked like all other freight yards in St. Louis, a desolate, sterile landscape. I revisited it again in 1980, and to my surprise the vegetation was flourishing again, but no rarities could be detected. As it turned out, this freight yard was taken over by another railroad company (St. Louis and Southwestern Railway or Cotton Belt Route), which stopped all regular activities in the yard. Only one track was kept in operation for through-trains of other companies. As a consequence, the vegetation was thoroughly trivial.

On the basis of these observations, it is possible to enumerate a rule concerning the weed killing process. If herbicide spraying in a yard is discontinued, vegetation will promptly reappear. In case the usual operations of a yard are not continued, trivialization will follow, but when normal operations of a yard are continued, synanthropes appear. How many and which kind will depend on the volume and character of the cargo. But natives may also appear for the first time. My conviction that native plants are also spread by railroads was strengthened by finding *Rudbeckia amplexicaulis* Vahl in 1976. It is a very conspicuous plant and it is inconceivable that I had overlooked it for 22 years.

As in other botanical endeavors, railroad

botany published determinations of synanthropes must occasionally be changed. In Mühlenbach (1979) *Kochia iranica* (Hausskn. & Bornm.) Litw. turned out to be *K. sieversiana* (Poll.) C. A. Mey. according to W. A. Weber. *Kochia sieversiana* has been found repeatedly in Missouri, but in only one place, Stockyard Switch, Joplin, Jasper County. *Centaurea stoebe* L. subsp. *stoebe* and *C. maculosa* Lam. in Mühlenbach (1979) turned out to be the same species. According to G. Wagenitz (Göttingen), who has determined my *Centaurea* material, plants of the *C. stoebe* group are not rare in North America, but have mostly been determined as *C. maculosa*.

A mistake in the citation for Sauer (1967) was also made in Mühlenbach (1979) and is here corrected.

R. L. Stuckey has kindly pointed out to me that there is an older American paper (Stair, 1900) on railroad weeds, that was overlooked by me earlier. Besides this he mentioned two other more recent papers (Catling & McKay, 1974; Thompson & Heineke, 1977) not cited by me. An additional paper that has recently been published is Arnold (1981).

Mrs. Jean Warholic (Freeville, N. Y.) brought to my attention Ross (1943). This paper treats the weeds at the Knapp farm of George Peabody College for Teachers in 1923. Among other things, the plants on the right-of-way of the Nashville, Chattanooga & St. Louis Railroad that transverses the farm were enumerated and evaluated—altogether 82 species. The great majority were also found in St. Louis.

It also seems worthwhile to mention here a corrected determination for *Arctium tomentosum* Mill., mentioned as a synanthropic species in Steyermark (1963). Both collections at MO are not *A. tomentosum* but *A. minus* (Hill.) Bernh.

LITERATURE CITED

ARNOLD, R. M. 1981. Weeds that ride the rails. Nat. Hist. 90(8): 58–65.

CATLING, P. M. & S. M. MCKAY. 1974. An interesting association of plants along a railway track at West Hill, Ontario. Ontario Field Biol. 28: 49–51.

CORRELL, D. S. & M. C. JOHNSTON. 1970. Manual of the Vascular Plants of Texas. Texas Research Foundation, Renner, Texas.

FERNALD, M. L. 1950. Gray's Manual of Botany. Ed. 8. American Book Co., New York.

GLEASON, A. H. 1968. The New Britton and Brown Illustrated Flora of the Northeastern United States and Adjacent Canada. Hafner Publ. Company, Inc., New York.

HAYWARD, I. M. & G. C. DRUCE. 1919. The Adventive Flora of Tweedside. T. Buncle & Co., Arbroath.

HEGI, G. 1935–1974. Illustrierte Flora von Mittel-Europa, Ed. 2. Carl Hanser Verlag, München.

HERMANN, F. J. 1970. Manual of the Carices of the Rocky Mountains and Colorado Basin. Forest Service, U.S.D.A. Agriculture Handbook No. 374, Washington, D.C.

JALAS, J. & J. SUOMINEN. 1979. Atlas florae Europeae. Distribution of Vascular Plants in Europe. The Committee for Mapping the Flora of Europe and Societas Biologica Fennica Vanamo, Helsinki.

MÜHLENBACH, V. 1979. Contributions to the synanthropic (adventive) flora of the railroads in St. Louis, Missouri, U. S. A. Ann. Missouri Bot. Gard. 66: 1–108.

OHWI, J. 1962. On Japanese *Echinochloa*. Acta Phytotax. Geobot. 20: 50–55.

ROSS, M. R. 1943. The weeds in certain fields at Knapp farm. J. Tennessee Acad. Sci. 18: 334–349.

SAUER, J. D. 1967. The grain amaranths and their relatives: a revised taxonomic and geographic survey. Ann. Missouri Bot. Gard. 54: 103–137.

SCHULTZ, A. A. 1976. Adventive flora on the territory of Riga railway junctions. Bot. Žurn. (Moscow & Leningrad) 61: 1445–1454.

SHILDNECK, P., A. G. JONES & V. MÜHLENBACH. 1981. Additions to the vouchered records of Illinois plants and a note on the occurrence of *Rumex cristatus* in North America. Phytologia 47: 265–290.

STAIR, L. D. 1900. Report on railroad weeds. 8th Annual Rep. Ohio Acad. Sci. 44–50.

STEYERMARK, J. A. 1963. Flora of Missouri. The Iowa State Univ. Press, Ames, Iowa.

THOMPSON, R. L. & T. E. HEINEKE. 1977. Vascular flora of the Desota-Hallidayboro railroad prairie strips, Jackson County, Illinois. Trans. Illinois State Acad. Sci. 70: 114–127.

VELENOVSKÝ, J. 1898. Flora Bulgarica. Supplement I. Fr. Řivnáč, Prague.

VICKERY, J. W. 1975. *Echinochloa*. Pp. 189–211 *in* Gramineae. Flora of New South Wales. National Herb. New South Wales, Sydney.

YABUNO, T. 1966. Biosystematic study of the genus *Echinochloa*. Jap. J. Bot. 19: 277–323.